TRADE AGREEMENTS AND LATIN AMERICAN TRADE (CREATION AND DIVERSION) AND WELFARE

2020

BANCO DE ESPAÑA
Eurosistema

Documentos de Trabajo
N.º 2009

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(*) The views expressed in this paper are those of the authors and do not necessarily represent the views of Banco de España or the Eurosystem. We would like to thank Yoto Yotov, Mario Larch, Salvador Gil Pareja, Alessandro Galesi, Omar Rachedi, Alonso Alfaro Ureña, Julia Wörz, Thomas Reininger, Francesca Viani and the other participants of the September 2019 Research Seminar, October 2019 XXIV Annual Meeting of the Central Bank Researchers Network at Banco de España, November 2019 XVI INTECO Workshop, and December 2019 17th ESCB Emerging Markets Workshop at the OeNB. All remaining errors are ours.

Documentos de Trabajo. N.º 2009

2020

ISSN: 1579-8666 (on line)

Abstract

This study analyses the process of economic integration in Latin America. Making use of a structural gravity model, this paper provides an ex-post assessment of the effect of the trade agreements (TAs) signed by Latin American countries on international trade. We account for the last wave of TAs proliferation and estimate treaty level effects. On average, TAs had a positive effect on Latin American trade. This holds true for both intra-Latin American agreements and agreements between Latin American countries and the rest of the world. However, we unveil that these average estimates cover a substantial degree of heterogeneity across TAs. Additionally, we quantify ex-ante general equilibrium effects on the trade volumes and welfare of Latin American countries under different scenarios of deeper integration.

Keywords: international trade, trade agreements, Latin America, welfare effects.

JEL classification: F13, F14, F15, O54.

Resumen

Este documento analiza el proceso de integración económica en América Latina. Utilizando un modelo de gravedad estructural, proporciona una evaluación *ex post* del efecto de los acuerdos comerciales firmados por los países latinoamericanos en el comercio internacional. Tenemos en cuenta la última ola de proliferación de acuerdos comerciales y estimamos los efectos de cada uno. De promedio, los acuerdos comerciales tuvieron un efecto positivo en el comercio latinoamericano. Esto es válido tanto para los acuerdos intralatinoamericanos como para los acuerdos entre países latinoamericanos y el resto del mundo. Sin embargo, descubrimos que estas estimaciones promedio cubren un importante nivel de heterogeneidad entre los acuerdos comerciales. Además, cuantificamos los efectos de equilibrio general *ex ante* sobre los volúmenes de comercio y el bienestar de los países latinoamericanos en diferentes escenarios de integración más profunda.

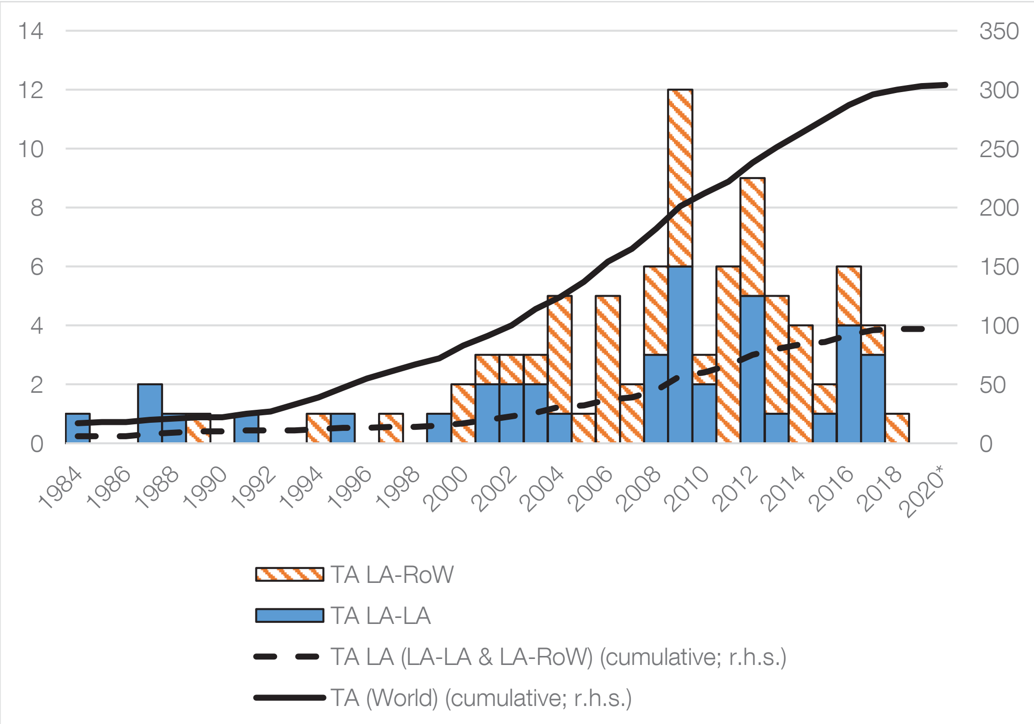
Palabras clave: comercio internacional, acuerdos comerciales, América Latina, efectos de bienestar.

Códigos JEL: F13, F14, F15, O54.

1. Introduction

A deeper integration among Latin American countries and between the region and the rest of the world has long been argued as one of the possible catalyst for promoting economic development in the area. Policy-makers have not turned a deaf ear to these appeals and have been very active, since the creation of the Central American Economic Integration Agreement (CAEIA) in 1961, the first trade agreement (TA) in the region and one of the first in the world since WWII (Baier et al., 2007). Since the 2000s, with WTO-wide trade talks deadlocked in the Doha round, the number of TAs signed by Latin American countries skyrocketed (see Figure 1).[1] The increasing relevance of bilateral and regional trade agreements in the international trade architecture goes hand in hand with the growing necessity of understanding to what extent these treaties achieved their agreed objectives, i.e. to promote trade among their partners.

Figure 1: Trade agreements involving at least one Latin American country



Note: TA LA-RoW identifies trade agreements where at least one Latin American country and one non-Latin American (i.e. "rest of the world") country are members. TA LA-LA identifies trade agreements where all members are Latin American countries. Columns represent the number of trade agreements signed in the corresponding year. Lines represent the cumulative number of trade agreements in force. Only trade agreements in force are counted. The year represents the year of entry into force. * Data include information up to February 2020.
Source: Authors' elaboration on WTO data.

[1] See Table 4 for more information on the agreements (name).

Making use of a structural gravity model, this paper provides an ex-post assessment of the effect of the TAs signed by Latin American countries on international trade, as well as ex-ante predictions of the effects of deeper trade integration for Latin American countries on trade and welfare. Our contribution to the literature is threefold. First, even if economic integration of Latin America has been widely studied (i.a. Camarero et al., 2016; Porto, 2007; Baier et al., 2007; Dixon and Haslam, 2006; Schiff, 2002; Rutheford and Martinez, 2000; Panagariya, 1996), to the best of our knowledge, there is practically no study that systematically focuses on the effects of TAs on trade including the last twenty years; second, we estimate treaty level effects in detail, unveiling a great degree of heterogeneity across TAs and country-pairs within the same agreement; and third, we quantify general equilibrium effects on the trade volumes and welfare of Latin American countries under alternative scenarios of deeper integration. To properly deal with trade data heteroscedasticity and "zeros", we perform these estimations using a poisson pseudo-maximum likelihood (Santos-Silva and Tenreyro, 2006). We also account for "intra-national" trade flows, as the increase in bilateral trade between TA members may derive from the choice of selling internationally rather than domestically.

We find that, overall, trade agreements have a positive and significant average effect on bilateral trade among members. However, when estimating the effects at the single agreement level, we discover a considerable degree of heterogeneity in the results. Indeed, 38 (64%) of the 59 estimations performed at the TA level have trade-enhancing effects, whereas 19 (32%) of them have no significant effect on trade. The remaining 2 (3%) have negative effect on trade. Our general equilibrium estimates show that deeper integration would suppose, overall, a substantial increase in trade and welfare for Latin American countries, but with a non-negligible degree of heterogeneity at the country level.

The rest of the paper is organized as follows: Section 2 presents the literature review, Section 3 the methodology and the data used for our partial equilibrium estimations, and Section 4 discusses the results obtained. Section 5 capitalizes on the literature and the rest of the paper to construct alternative scenarios of deeper integration and calculate general equilibrium trade and welfare effects. Section 6 draws the conclusions.

2. Literature review

What are the consequences of TAs on trade? The international trade literature has been dealing with this question since its very early days, predominantly by the means of exploiting the predictive power of gravity equations. Indeed, since what it is often referred to as the first gravity application in contemporary times (Tinbergen, 1962), gravity equations relate trade flows between two countries to their economic mass and distance (see Lampe and Sharp, 2019, for more details on the history of gravity). These models also consider the role of trade policy, usually by including information on the existence of a TA between the two parties or a TA that includes the two parties among the members. From a methodological perspective, there have been a variety of developments on how gravity models are conceived and implemented, both from a theoretical and an empirical standpoint. Baldwin and Taglioni (2006) and Piermartini and Yotov (2016) provide wide-ranging summaries. Here, we restrict ourselves to three main issues that have been widely discussed in the literature and are functional to understand the motivation of our approach. The first issue relates to a potential problem of omitted variable bias: the importance of including the so-called "multilateral trade resistances" (MTRs) through the use of exporter-time and importer-time fixed effects, an idea elaborated by Anderson and van Wincoop (2003) exploiting the previous work of Anderson (1979).[2] As summarized by Lampe and Sharp (2019), these country-specific time-varying characteristics relates "to the idea of a 'home bias' that make them more or less reluctant to trade internationally". The second issue deals with the problem of endogeneity: countries that trade more among them may be more likely to sign a trade agreement. The gold standard in the gravity literature is the solution proposed by Baier and Bergstrand (2007): using panel data (instead of cross-sections) with country-pair fixed effects. However, recently, Larch et al. (2018) and Piermartini and Yotov (2016) proposed alternative ways to test for strict exogeneity: a) including pair time trends, to capture monotonic trends in the evolution of bilateral trade, and b) including leads of the trade agreement(s) dummy. In this case, in absence of reverse causality (in other words, if the trade agreement variable is strictly exogenous), the lead should be not statistically different from zero. We will consider these two approaches in the robustness analysis. The third issue involves the change in relative costs that occurred after the entry into force of a TA. A TA changes not only the relative costs of trading with a signatory partner versus a non-signatory partner, but also those of trading with a signatory partner instead of selling the product in the home market. Heid et al. (2017) propose a straightforward solution, which is to include intra-national trade, i.e. domestic sales (for a brief discussion see Sellner, 2019). These three adjustments allow us to provide unbiased estimations. Additionally, and perhaps more interestingly, we are able to estimate treaty level effects, unveiling a great degree of heterogeneity across TAs. We remark that, to the best of our knowledge there is no study providing such estimates. However, the literature provides a number of scholar efforts that 1) estimate

[2] In this work, Anderson established the theoretical foundations of the "economic gravity".

the average effect of TAs on trade in Latin America; 2) implement case studies for certain regional agreements, 3) present separately the individual TA effect for a set of agreements. Those are obvious candidates for setting the context and serving as comparisons.

The literature concludes that, on average, TAs have been largely beneficial for Latin American countries (IADB, 2018; Hannan, 2017; Florensa et al., 2015; Márquez-Ramos et al., 2015; Soloaga and Wintersb, 2001). However, the aggregate result hides a substantial degree of heterogeneity at the geographical and agreement level. On one side, geographically, IADB (2018) finds that agreements among Latin American countries[3] have sizeable effects on bilateral trade among members. Those effects are found to be larger than those of the agreements implemented between Latin American countries and the "rest of the world" (RoW). On the other side, at the agreement level, there are a variety of studies, sometimes with contrasting results.[4] These case studies focused mainly on the Americas' biggest RTAs: the North American Free Trade Agreement (NAFTA), the Southern Common Market (Mercosur), the Andean Community (CAN), the Central American Common Market (CACM) and the Caribbean Community (CARICOM). For example, most of the literature agrees that NAFTA had positive effect on trade (Carrère, 2006; Romalis, 2007; Fratianni and Oh, 2009; Geldi, 2012; Caliendo and Parro, 2015) for its members.[5] The Andean Community has also largely been regarded as an agreement that fostered intra-bloc trade (Carrillo-Tudela and Li, 2004; Yamarik and Ghosh, 2005; Lee and Park, 2005; Trotignon, 2009). As acknowledged by Coulibaly (2009), Mercosur effects are more debated. For example, Baier et al. (2019), Martinez-Zarzoso and Nowak-Lehmann (2003), Recalde and Florensa (2008), and Cuenca Garcia et al. (2013) find positive effects on intra-block trade, whereas Carrillo-Tudela and Li (2004) and Geldi (2012) argue that the Mercosur integration did not deliver results in terms of intra-block trade.

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[3] Their estimates refer to the six main regional trade agreements in the region, such as the Andean Community (CAN), the Central American Common Market (CACM), the Dominican Republic – Central America Free Trade Agreement (DR-CAFTA), the Caribbean Community (CARICOM), the Southern Common Market (Mercosur) and the North American Free Trade Agreement (NAFTA).

[4] While in the following part of this section we report a brief summary for those TAs that received more attention, Cipollina and Salvatici (2010) and Head and Mayer (2014) provide a wider summary of the gravity literature with meta-analysis techniques.

[5] Foster and Stehrer (2011) find a negative (or non-significant) effect of the NAFTA on trade. However, they seem to incur in what Baldwin and Taglioni (2006) defined as "silver medal mistake" of gravity equations (generally, gravity equations focus on uni-directional bilateral trade; however, if researchers decide to use two-way exports gravity theory prescribes to use the sum – or the average – of the logarithm of uni-directional trade flows rather than the logarithm of the sum), and to exclude zero trade flows (possible self-selection bias). On an earlier exercise Baier et al. (2007) find that the NAFTA had no effect on trade, however they justify the result as follows: "Since NAFTA was phased in over a 10-year period starting in 1994, the coefficient estimate for NAFTA will only pick up six years of the agreement, and only partial liberalization" (p.1371).

In this context, our contribution to the literature is threefold: first, we provide updated estimates of the effect of TAs involving at least one Latin America country on intra-block trade flows, not only incorporating the much less studied developments of the last twenty years (i.e. including in the analysis the proliferation of bilateral TAs) but also using state-of-the-art gravity techniques (Yotov et al., 2016; Baier et al., 2019), which allows to deal with MTRs and endogeneity. Second, we exploit some of the novel features of the methodology (i.e. the use of domestic trade flows) to disentangle the effects on trade at the single TA level. We use total trade flows, instead of manufacturing, due to the importance of agriculture, mining and oil in Latin American trade.[6] Third, we provide general equilibrium effects on trade (creation and diversion) and welfare of Latin American countries under different scenarios of deeper integration (see Section 5 for details).

3. Methodology and data

3.1. Empirical strategy

Our empirical strategy follows Anderson and van Wincoop (2003), Head and Mayer (2014) and Yotov et al. (2016): we implement a structural gravity model that explains bilateral trade flows (exports) by transaction costs and economic size, while controlling for multilateral trade resistances (MTRs) and endogeneity issues.

We follow the standard procedure in the literature using the methodology proposed by Santos Silva and Tenreyro (2006), i.e. a pseudo-poisson maximum likelihood estimating procedure, which allows to properly deal with zero trade values. Additionally, following Yotov (2012), Dai et al. (2014) and Larch et al. (2018), we explicitly consider intra-national trade flows (X_{ijt}, ∀ i=j) to account for possible additional trade creation effects (deriving from the choice of selling internationally rather than domestically). Therefore, our main specification can be written as follows:

$$X_{ijt} = \exp\left(\beta_0 + \beta_1 TA_{ijt} + \delta_{it} + \gamma_{jt} + \omega_{ij}\right) + \varepsilon_{ijt} \quad (1)$$

where X_{ijt} are exports of country i to country j at time t. Country i (or j) is either a Latin American country, a OECD country, or a BRICS country.[7] In this way, we account for approximately the 85% of Latin American countries total trade. TA_{ijt} is a dummy

[6] See "Data" for more details.

[7] BRICS: Brazil, Russia, India, China and South Africa.

variable. It is equal to one when the dyad ij has a trade agreement in force at time t, and zero otherwise. In the spirit of Anderson and van Wincoop (2003), δ_{it} and γ_{jt} account for MTRs and all the other country-time varying characteristics (e.g. GDP), ω_{ij} are dyad fixed effects, and represent Baier and Bergstrand (2007) solution to endogeneity issues related to trade policy variables. Therefore standard gravity variables varying by country-pair are automatically excluded from the regression and cannot be estimated (distance, contiguity, common language, colonial relationship, etc.).

In equation (2), we further disentangle the average "TA effect" into different "averages" for three types of TA: among Latin American countries; between Latin American countries and non-Latin American countries; and among non-Latin American countries (the "rest of the world").

$$X_{ijt} = \exp\left(\beta_0 + \beta_1 TA_{ijt}^{LA-LA} + \beta_2 TA_{ijt}^{LA-RoW} + \beta_3 TA_{ijt}^{RoW-RoW} + \delta_{it} + \gamma_{jt} + \omega_{ij}\right) + \varepsilon_{ijt} \quad (2)$$

TA_{ijt}^{LA-LA} is equal to 1 if exporter *i* is in a TA with importer *j* at time *t*, where *i,j* are Latin American countries and 0 otherwise. TA_{ijt}^{LA-RoW} is equal to 1 if exporter *i* is in an agreement with importer *j* at time *t*, where either *i* or *j* (but not both at the same time) are Latin American countries and 0 otherwise. $TA_{ijt}^{RoW-RoW}$ is equal to 1 if exporter *i* is in an agreement with importer *j* at time *t*, where *i,j* are not Latin American countries and 0 otherwise.

Finally, we move beyond the dichotomy indicated by Kohl (2014) – the apparent scarcity of studies that combine advanced econometrics with ad-hoc agreement analysis (Kohl itself, Baier et al., 2018, Baier et al., 2019, and Freeman and Pienknagura, 2019, are relevant exceptions) – by estimating the effect of each of the TA (involving at least one Latin American country) included in our database separately in equation (3), where K is the number of agreements involving at least one Latin American country.

$$X_{ijt} = \exp\left(\beta_0 + \sum_{k=1}^{K} \beta_1^k TA_{ijt}^k + \beta_2 EU + \beta_3 TA_{ijt}^{RoW-RoW} + \delta_{it} + \gamma_{jt} + \omega_{ij}\right) + \varepsilon_{ijt} \quad (3)$$

We combine all agreements among non-Latin American countries into the variable $TA_{ijt}^{RoW-RoW}$, where i, $j \notin$ Latin America, with the exception of the European Union (EU) whose effect we estimate separately. We set $TA_{ijt}^{RoW-RoW}$ equal to zero when the EU dummy is equal to one (i.e. when both exporter and importer are member states of the EU), so the coefficient β_2 represents the level of bilateral trade increase due to the EU, and it is directly comparable to the other coefficients (β_1^k).[8]

3.2. Data

Export data are from the World Trade Flows (WTF) database (Feenstra and Romalis, 2014).[9] Importantly, the WTF database reports total bilateral trade between country pairs. Therefore, it includes not only manufacturing but also mining and agricultural goods, which represent an essential share of Latin American exports. Intra-national trade flows are not readily available. To maximize the number of Latin American countries in our database, we follow Yotov (2012) and calculate intra-national flows (X_{ijt}, ∀ i=j) as the difference between GDP (available from the World Bank World Development Indicators database) and total national exports (from IMF DOTS).[10] Trade agreements information has been retrieved from the World Bank Horizontal Depth Database (Hofmann et al., 2017; Hofmann et al., 2019), which contains detailed information on the trade agreements in force. The period of analysis is 1984-2015. The sample includes 53 exporters and the same number of importers (a complete list is reported in the Appendix).

4. Results and discussion

In consonance with our empirical strategy, we first proceed to present the estimates of the "average" TA effect on trade. These results, derived from our structural gravity model, are displayed in Table 1.

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[8] An alternative approach would have been to keep $TA_{ijt}^{RoW-RoW}$ equal to one when the EU dummy is equal to one. In that case, β_2 would have represented the deviation of the "EU effect" from the average $TA_{ijt}^{RoW-RoW}$ effect.

[9] The WTF is based on the UN COMTRADE database, cleaned of those observations where importer and exporter declarations differ by implausibly large amounts (i.e. the ratio between the two is either <0.1 or >10).

[10] While we are aware of a set of alternative approaches to calculate intra-national flows, such as 1) assembling information on provincial/regional trade from a wide range of statistical sources (e.g. agricultural and industrial production, transportation of goods, industrial production, interregional and international trade; for the Spanish case, see the C-intereg Project – http://www.c-intereg.es/index.asp), 2) using information contained in input-output tables (see Larch et al., 2018) or 3) exploiting data on gross output and exports (Chen, 2004; de Sousa et al., 2012; Dai et al., 2014; Borchert and Yotov, 2017), using them would substantially reduce the number of Latin American countries included in our database, as well as the time span of the analysis. However, due to the set of fixed effects we include in the regressions (i.e. importer-time, exporter-time and pair fixed effects) what matters is not the level of intra-national trade relative to international trade (as far as this is positive, and this is the case in our database) but the relative change. Therefore, this also reduces the concern of subtracting gross data (exports) from value added data (GDP). Finally, we are additionally reassured by the fact that our overall results are in line with Baier et al. (2019), who use gross output instead of value added to estimate intra-national flows. Moreover, for those agreements that are comparable (Baier et al., 2019, use manufacturing trade only for the period 1986-2006 and we use total trade for 1984-2015, therefore comparable agreements are those with bilateral trade mainly in manufacturing goods), NAFTA and Mercosur being the main example, results are also similar in both sign and size.

Table 1: Structural gravity – "average" and by "geography" TA effect

Agreement	"Average" w/o intra-national flows (1)	By "geography" w/o intra-national flows (2)	"Average" with intra-national flows (3)	By "geography" with intra-national flows (4)
TA	0.1031***		0.4745***	
	(0.0374)		(0.0619)	
TA (LA-LA)		0.3016**		0.5509***
		(0.1226)		(0.1115)
TA (LA-RoW)		0.1905***		0.5695***
		(0.0508)		(0.0705)
TA (RoW-RoW)		0.0699		0.4413***
		(0.0448)		(0.0705)
Observations	82,552	82,552	88,122	88,122
Intra-national flows	NO	NO	YES	YES
Dyad FEs	YES	YES	YES	YES
Exp.-time & imp.time FEs	YES	YES	YES	YES

Note: Poisson regressions. Dependent variable: Bilateral exports. Fixed effects and constants not reported for the sake of simplicity. Standard errors (in parentheses) are clustered at the importer-time, exporter-time and dyad level.
***p < 0.01, **p < 0.05, *p < 0.1
Source: Authors' elaboration

Overall, in accordance with the literature (both in terms of sign and size), trade agreements included in our sample have a positive and significant average effect on bilateral trade among members: in this specification trade agreements lead to approximately a 10% (i.e. 100*$[e^{\beta^{TA}} - 1]$) increase in trade (see Column 1). When we separate trade agreements by "geography" (Latin America – Latin America; Latin America – rest of the world; rest of the world – rest of the world), results do not change: the effects of a TA on bilateral trade flows are positive independently of the "geography" of the agreement (with the exception of TA RoW-RoW).[11] The point estimate is larger for agreements among Latin American countries, however the coefficients are not statistically different among them. The sign and significance of the result do not change when we include our estimations of intra-national flows in the regression (see Column 3 and 4), albeit in this case the point estimates of the coefficients are larger: when accounting for intra-national trade flows, trade agreements generated, on average, a 60% increase in trade (Column 3). The higher coefficient is in line with the literature, as in this way we are taking into account also trade creation effects from "domestic sales" (i.e. intra-national flows) to international flows, i.e. the part of domestic production that, as a

[11] We also estimate the models with directional pair fixed effects (instead of symmetric pair fixed effects). This change only affects the coefficient of TA RoW-RoW in the regression excluding intra-national flows: the coefficient turns (positive) significant (from non-significant, see Column 2).

consequence of an international trade agreement is sold internationally rather than nationally (see Dai et al., 2014; and Baier et al., 2019).

These estimations are robust to a series of alternative specifications (see Table 2 for "average" results, and Table 3 for results by "type"). Following Larch et al. (2018), a) we use every other year time intervals instead of consecutive years, as trade policy effects may take more than one year to fully materialize (Column 1 of Table 2 and 3); b) we allow for the existence of time-varying distance effects (i.e. the "distance effect" is smaller over time, in line with the literature, see Anderson and Yotov, 2010; Borchert and Yotov, 2017) (Column 2 of Table 2 and 3) and, in a similar fashion, c) we include the interaction of the dummy for international border (=1 when $i \neq j$) with the time dummies, to account for the "globalization effect" (i.e. international trade costs are decreasing over time) (Column 3 of Table 2 and 3). Column 4 and Column 5 (both Table 2 and 3) provide additional robustness tests for strict(er) exogeneity of trade agreements. In Column 4 we include a pair time trend. In this way we are able to control for the existence of a monotonic trend that may bias the TA coefficient. The inclusion of bilateral trends reduces the point estimates. In the case of intra-Latin American agreements, the coefficient is only marginally significant (very close to 10% level). As argued in Larch et al. (2018), a non-significance of the coefficient points to possible "endogeneity issues due to time-varying bilateral unobserved heterogeneity, or be driven by a lack of identifying variation" (p.233). However, the results in Column 5 mitigate the doubts concerning the existence of endogeneity. Indeed, in Column 5, following Piermartini and Yotov (2016) and Kohl et al. (2016), we perform another test of strict exogeneity, including the lead of the trade agreement dummy. In the absence of reverse causality, the lead should not be statistically different from zero. As indicated in Piermartini and Yotov (2016) and to avoid capturing anticipation effects, we test the last hypothesis using four-year intervals. Results confirm the variables to be strictly exogenous as all the leads (aggregate, intra-Latin America, Latin America – rest of the world, rest of the world – rest of the world) are not significant and economically irrelevant, whereas the contemporaneous trade agreements variables are all positive and significant.[12]

[12] We also perform other robustness tests using two-year and one-year intervals. Most results hold. The only exception is for the TA (LA-LA) lead, which becomes significant. This result may be driven by either by anticipation effects (trade increases before the agreement becomes active as exporters and importers are internalizing its future effects when entering into force) or possible endogeneity. The latter prospect is somewhat mitigated by i) the battery of fixed effects included in our main regression; ii) the result of previous endogeneity tests (Table 3, Column 4 and Column 5); and the fact that only (approximately) 15 percent of Latin American exports were directed to another Latin American country at the beginning of our sample.

Table 2: "Average" TA effect – Robustness tests

Agreement	(1) Two-year intervals	(2) Distance trend	(3) Globalization trend	(4) Pair trend	(5) Leads
TA	0.4946***	0.3088***	0.2238***	0.1986***	0.5218***
	(0.0668)	(0.0629)	(0.0655)	(0.0653)	(0.0821)
TA (t+1)					-0.0801
					(0.0650)
Observations	44,010	88,122	88,122	88,122	21,850
Dyad FEs	YES	YES	YES	YES	YES
Exp.-time & imp.time FEs	YES	YES	YES	YES	YES
Two year inter.	YES	NO	NO	NO	YES (4 years)
Distance trend	NO	YES	NO	NO	NO
Glob. trend	NO	NO	YES	NO	NO
Pair trend	NO	NO	NO	YES	NO

Note: Poisson regressions. Dependent variable: Bilateral exports. Fixed effects and constants not reported for the sake of simplicity. Standard errors (in parentheses) are clustered at the importer-time, exporter-time and dyad level.
***p < 0.01, **p < 0.05, *p < 0.1
Source: Authors' elaboration

Table 3: TA effect by geography" – Robustness tests

Agreement	(1) Two-year intervals	(2) Distance trend	(3) Globalization trend	(4) Pair trend	(5) Leads
TA (LA-LA)	0.6158***	0.4310***	0.4281***	0.2704*	0.5088***
	(0.1314)	(0.1189)	(0.1191)	(0.1625)	(0.1610)
TA (LA-RoW)	0.4616***	0.3587***	0.3101***	0.2116***	0.6629***
	(0.0796)	(0.1282)	(0.0789)	(0.0811)	(0.0951)
TA (RoW-RoW)	0.5840***	0.2901***	0.1901**	0.1921**	0.4769***
	(0.0860)	(0.0677)	(0.0767)	(0.0843)	(0.0955)
TA (LA-LA) (t+1)					0.0676
					(0.0755)
TA (LA-RoW) (t+1)					-0.0805
					(0.0742)
TA (RoW-RoW) (t+1)					-0.0833
					(0.0801)
Observations	44,010	88,122	88,122	88,122	21,850
Dyad FEs	YES	YES	YES	YES	YES
Exp.-time & imp.time FEs	YES	YES	YES	YES	YES
Two year inter.	YES	NO	NO	NO	YES (4 years)
Distance trend	NO	YES	NO	NO	NO
Glob. trend	NO	NO	YES	NO	NO
Pair trend	NO	NO	NO	YES	NO

Note: Poisson regressions. Dependent variable: Bilateral exports. Fixed effects and constants not reported for the sake of simplicity. Standard errors (in parentheses) are clustered at the importer-time, exporter-time and dyad level.
***p < 0.01, **p < 0.05, *p < 0.1
Source: Authors' elaboration

Table 4 contains agreement level estimates (see equation 3) of the standard structural gravity model.[13] Results show that we disentangled agreement level estimates for a total of 59 TAs (plus the EU and the aggregate estimate of the "rest of TAs" in the sample) including at least one Latin American country (plus we estimate the EU effect separately). Out of these 59 TAs, 38 (64% of the agreements in our sample) have trade-enhancing effects, whereas 19 (32%) of them have no significant effect on trade. The remaining 2 (3%) have negative effect on trade. [14] The estimates presented in our study are close to those in Baier et al. (2019), counting a trade promoting effect for more than a half (53%) of the agreements. On the other side, Kohl (2014) finds that only approximately a quarter (27%) of the agreements included in his sample have a positive effect on trade. The difference with the latter study may depend on the methodology and data used, as Kohl (2014) does not use poisson estimations nor intra-national flows.[15]
Interestingly enough, many of our estimates are similar to those obtained by previous studies. Indeed, those that are comparable are very close in size and sign with the coefficient provided by Head and Mayer (2014) in their meta-analysis. In particular, we find the NAFTA, the Mercosur, and the Andean Community effects to be positive and economically significant in size. The insignificant effect of the EC-CARIFORUM agreement may depend on the limited number of Caribbean countries included in the sample (due to data availability constraints). The majority of EU agreements with countries in the region seem to have positive effects on bilateral trade. Additionally, we singled out the "EU effect", confirming the positive effect of EU integration for trade among its member states. Moreover, we also present a set of estimates for agreements that have not previously been studied (e.g. EU – Colombia and Peru; Colombia – Northern Triangle, i.e El Salvador, Guatemala, Honduras; Costa Rica – Peru; Japan – Peru; etc.).

As next step, inspired by Baier et al. (2019) that showed important variation of trade effects across country-pairs within the same TA, we further dissect the TA trade effects. We estimate directional pair specific estimates for those TA among Latin American countries only (TA LA-LA) and those TA between Latin American countries and non-

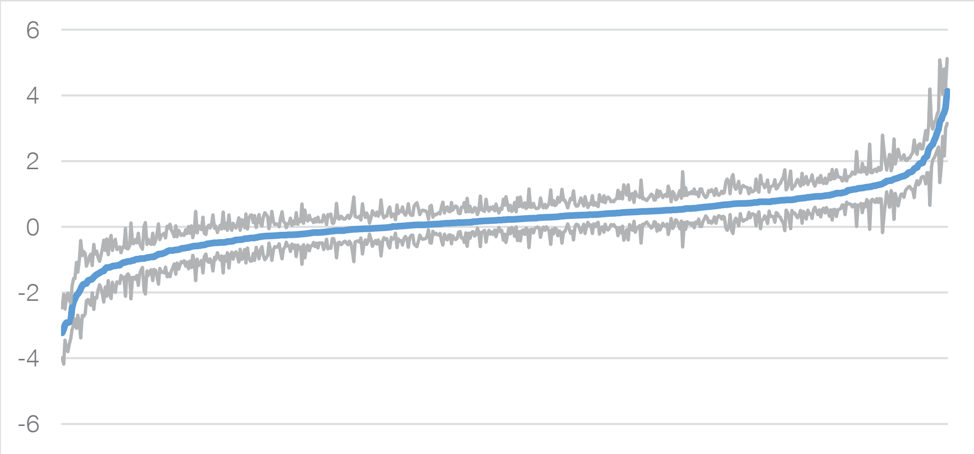
[13] Robustness tests in line with Table 2 and 3 have been performed, but not reported for the sake of simplicity. There are no drastic changes in the results.
[14] These numbers are calculated assigning the "positive", "neutral" and "negative" effect on trade depending on the sign and significance of the coefficient.
[15] When we exclude intra-national trade flows, we find that only a third of the trade agreements in the sample has positive effects on trade (20 out of 59, 34%), whereas almost two thirds have no significant effect (37 out of 59, 63%). As in the case of including intra-national trade flows, only two trade agreements are found to have negative effects (3% of the sample)..

Table 4: Structural gravity – Agreement level estimates

Agreement		Agreement		Agreement	
CAFTA-DR	0.2320***	**Chile-Korea (Republic of)**	0.7792***	**MERCOSUR**	0.8570***
	(0.0612)		(0.0882)		(0.2676)
CAN	0.5497***	**China-Costa Rica**	0.3811*	**Mexico-Central America**	0.3322***
	(0.1762)		(0.2035)		(0.1277)
Canada-Chile	0.6216***	**China-Peru**	0.6356***	**Mexico-Uruguay**	0.5841***
	(0.0678)		(0.1712)		(0.0718)
Canada-Colombia	-0.0608	**Colombia-Mexico**	1.3563***	**NAFTA**	0.4716***
	(0.0950)		(0.1141)		(0.1556)
Canada-Costa Rica	0.1274	**Colombia-Northern Triangle**	0.5208***	**Panama-Chile**	0.3872
	(0.0827)		(0.1542)		(0.2485)
Canada-Honduras	0.3269	**Costa Rica-Peru**	-0.1363	**Panama-Costa Rica**	0.0908
	(0.2201)		(0.1774)		(0.2554)
Canada-Panama	-0.4147**	**Dominican Republic - Central America**	1.1191***	**Panama-El Salvador**	0.2314
	(0.1726)		(0.1268)		(0.1675)
Canada-Peru	0.9001***	**EC-CARIFORUM**	-0.2056	**Panama-Guatemala**	0.2157
	(0.1694)		(0.1453)		(0.2211)
CARICOM	-0.0021	**EC-Chile**	0.2934**	**Panama-Honduras**	-0.1844
	(0.2613)		(0.1309)		(0.3659)
CACM	0.0403	**EC-Mexico**	0.6397***	**Panama-Nicaragua**	-0.0689
	(0.1450)		(0.1345)		(0.3914)
Chile-Colombia	0.3182**	**EU-Central America**	-0.0983	**Panama-Peru**	0.2297
	(0.1556)		(0.1296)		(0.1804)
Chile-Costa Rica	0.6361***	**EU-Colombia and Peru**	0.2673***	**Peru-Chile**	0.2156*
	(0.1644)		(0.0834)		(0.1275)
Chile-El Salvador	1.0988***	**EFTA-Central America**	-0.3458*	**Peru-Korea (Republic of)**	0.7701***
	(0.1263)		(0.2019)		(0.1349)
Chile-Guatemala	-0.0293	**EFTA-Chile**	0.3841**	**Peru-Mexico**	0.5898***
	(0.1601)		(0.1845)		(0.2254)
Chile-Honduras	0.1190	**EFTA-Colombia**	0.0261	**TPSEP**	-0.0458
	(0.1503)		(0.1491)		(0.1027)
Chile-Mexico	0.6887***	**EFTA-Mexico**	0.3889***	**US-Colombia**	0.3019***
	(0.1229)		(0.0869)		(0.0557)
Chile-Nicaragua	0.4550***	**EFTA-Peru**	0.6263***	**US-Panama**	0.4352***
	(0.1554)		(0.2259)		(0.1428)
Chile-Australia	0.7538***	**El Salvador - Honduras - Ch. Taip.**	0.6267***	**US-Chile**	0.4391***
	(0.1488)		(0.2056)		(0.1238)
Chile-China	1.1424***	**Japan-Peru**	0.3165**	**US-Peru**	0.3558***
	(0.1381)		(0.1600)		(0.1201)
Chile-Japan	0.4343***	**Japan-Mexico**	0.5567***	**EU**	0.4348***
	(0.1415)		(0.0942)		(0.0818)
				Other TAs	0.5310***
					(0.0956)
Observations			88,122		
Dyad FEs			YES		
Exporter-time and importer-time FEs			YES		

Note: Poisson regressions. Dependent variable: Bilateral exports. Constant not reported for the sake of simplicity. Robust standard errors (in parentheses) are clustered at the importer-time, exporter-time and dyad level.

Figure 2: Structural gravity – directional pair level estimates



Note: Distribution of direction-specific pair TA effects, 95% confidence intervals.

Table 5: Structural gravity – directional pair estimates – Mercosur and NAFTA

Mercosur Pairs	$\beta_{Mi\text{-}Mj}$	s.e.	Mercosur Pairs	$\beta_{Mi\text{-}Mj}$	s.e.
Argentina→Brazil	1.0237***	0.1852	**Paraguay→Argentina**	1.2802***	0.2268
Argentina→Paraguay	0.7915***	0.1918	**Paraguay→Brazil**	0.4295*	0.2299
Argentina→Uruguay	0.3778*	0.1952	**Paraguay→Uruguay**	1.7474***	0.2408
Brazil→Argentina	1.4168***	0.1588	**Uruguay→Argentina**	0.4715**	0.2221
Brazil→Paraguay	-0.0166	0.2013	**Uruguay→Brazil**	-0.1695	0.2392
Brazil→Uruguay	-0.2505	0.1873	**Uruguay→Paraguay**	1.1016***	0.2302
NAFTA Pairs	$\beta_{Mi\text{-}Mj}$	s.e.	NAFTA Pairs	$\beta_{Mi\text{-}Mj}$	s.e.
Canada→Mexico	1.2445***	0.2082	**Mexico→US**	1.2252***	0.2176
Canada→US	0.3665***	0.1140	**US→ Canada**	0.2020*	0.1101
Mexico→Canada	1.4616***	0.2288	**US→Mexico**	0.4683**	0.2061

Note: Poisson regressions. Dependent variable: Bilateral exports. The table includes examples of directional pair estimates of partial equilibrium effects for Mercosur and NAFTA. Standard errors are clustered at the importer-time, exporter-time and dyad level. ***p < 0.01, **p < 0.05, *p < 0.1
Source: Authors' elaboration

Latin American countries (TA LA-RoW) included in our sample. This means that we obtain 635 directional estimates. Showing in a table all the estimates collected will not be very practical, therefore we decide to recapitulate the information in two ways: first, we depict all the coefficients with their respective confidence intervals, ordered from the lowest to the highest (see Figure 2). Second, we delve into two case studies of important regional agreements, one including Latin American countries only, the Mercosur (see Table 5), and another involving both Latin American and non-Latin American countries, the NAFTA (see Table 5).

Figure 2 depicts the distribution of the directional pair specific TA effects. While all the limitations described in Baier et al. (2019) also hold in our case,[16] we are able to show the great degree of heterogeneity present in our estimates. The number of positive and significant directional pair estimates is slightly above the reference study cited above, and corresponds to 40%.

As previously mentioned, Table 5 is an alternative way to show the same point. There is a great degree of heterogeneity within TAs. It is interesting to see that our directional pair estimates of the case studies presented are largely in line with our expectations: in the case of Mercosur, they point out that the agreement generated large increases in trade between Argentina and Brazil (in both directions). Mercosur also had large effects on trade between its two smaller members, Uruguay and Paraguay (in both directions). Trade between large and small members saw a more moderate increase, if any. In the case of NAFTA, our estimates confirm that all members benefited from the agreement, in terms of increases in exports to the other NAFTA members. Mexican exports to US and Canada, as well as Canadian exports to Mexico report the largest increases with respect to situation previous to the entry into force of the agreement. However, US exports to Mexico and Canada, as well as Canadian exports to US also experienced a large expansion during the same period.

5. General equilibrium theory, scenarios and results

In this section we compute the general equilibrium effects of deeper trade integration in Latin America. To guide our empirical analysis, we use the Baier, Yotov, and Zylkin (2019) structural gravity general equilibrium model (henceforth BYZ). The BYZ model is a one sector Armington-Constant Elasticity of Substitution (CES) trade model, with labor as the only factor of production. This is a standard and widely accepted approach in the literature.[17] Here we provide an overview on the main mechanisms behind the model: the in-depth description of the system of equations underlying the BYZ model is explained in detail in Baier et al. (2019) and Yotov et al. (2016).

The BYZ model begins with a standard structural gravity model *à la* Anderson and van Wincoop (2003): it relates (the value of) country of origin (country i) exports to the

[16] Baier et al. (2019) recognize that the more granular the estimate obtained, the wider the confidence bands of the coefficient, the higher the likelihood of incurring in an omitted variable bias or reverse causality.

[17] While these models do not include some features that may influence both the dimension of trade flows and the gains from trade (e.g. intra-industry trade, global value chains, etc, see Ignatenko et al., 2019; Kummritz et al., 2018), they show other interesting features such as tractability and very high explanatory power.

destination country (country j) expenditure. The strength of this relationship (or, in other words, the proportion of j's expenditure devoted to buy i's good) depends on three factors: the technology of production and wages (both exporter specific), and iceberg-type bilateral trade costs.[18] Their role in shaping i's exports depends on the exporter competition in the importer's market. The model combines a supply side characterized by the production of goods differentiated by country of origin, i.e. each country of origin "i" produces a different variety of a certain good, with a demand side based on CES preferences, i.e. consumers have a "love of variety" preference structure (consumers value to have different goods in their consumption basket). The goods are (imperfectly) substitutable. The degree of ease in substituting goods from different origin depends on the elasticity of substitution, which shapes the effect of both wages and trade costs. Finally, the model allows for the existence of trade imbalances, which are computed in an additive manner, levelling out any differences between national expenditure and national income.

The estimation procedure has two steps. In the first step, we compute the average partial effect of each TA using equation (3),[19] i.e. a structural gravity model. In the second step, we "shock" the model by reducing bilateral trade costs for certain country-pairs (depending on the scenario), say i and j. In the model, a change in bilateral trade costs not only affects bilateral trade of i and j, but also their multilateral trade resistances. We recall that multilateral resistances are included to account for the fact that the existence of other countries (other than i and j) influences trade between i and j.[20] In this way, country i and j will experience a decrease in their outward multilateral resistances, and the others (country k, k=1,...,n with k $\neq$i,j) a second-order increase (i.e. it depends on the choice of i and j to reduce bilateral trade costs). The model assumes that these effects translate into factory-gate prices as producers face a new international environment (more favorable for those countries that reduced bilateral trade costs). In turn, changes in factory-gate prices will have an effect on output values and expenditures. The model also allows for feedback effects from changes in the value of output/expenditure to trade, both directly (countries with higher output value trade more) and indirectly (through the multilateral

[18] This means that a part of each good sent from country i to country j "melts away" during the process, as it would happen to an iceberg traded between two countries. This is a standard assumption in the trade literature: see Samuelson (1954), Krugman (1980), Anderson and van Wincoop (2003), and Jacks et al. (2010).
[19] In this way we follow the standard approach in the literature to compute partial and general equilibrium effects.
[20] As Krugman exemplified (1995), if two European countries will be transplanted in the moon (rather than being in the middle of Europe) they will trade more among themselves, as there will be no other close substitute for sourcing imports or as an export destination.

resistances, as countries with higher output, or in gravity terminology countries that are "larger", have more influence on third-country trade).

Therefore, using the coefficient estimated in equation (3), we construct five different scenarios where we assume a reduction in bilateral trade costs for a varying set of Latin American countries:

a) In "Scenario 1", we model an increase in the "efficiency" of intra-Latin American TAs. In other words, we decrease bilateral trade costs for all intra-Latin American TAs dyads to those of the "best performer", i.e. the intra-Latin American TA that increased bilateral trade the most (Colombia – Mexico, $\beta_{COL\text{-}MEX} \approx 1.36$);
b) In "Scenario 2", we model an increase in the "efficiency" of agreements between Latin American countries and the rest of the world. In other words, we decrease bilateral trade costs for all dyads of those TAs that involve both Latin American and rest of the world countries to those of the "best performer", i.e. the Latin-American-rest of the world TA that increased bilateral trade the most (Chile – China, $\beta_{CHL\text{-}CHN} \approx 1.14$);
c) In "Scenario 3", we combine the "efficiency" gains modeled in the two previous scenarios
d) In "Scenario 4", we model the entry into force of a regional trade agreement (RTA) among all Latin American countries, with an effect on trade equal to the "best performer" among intra-Latin American TAs (Colombia – Mexico, as above);
e) In "Scenario 5", we lower the expected effect of such RTA to the average effect of the existing TAs among Latin American countries.

We use the most recent year in our database, 2015, as the reference year for the calculations. As in Baier et al. (2019), and following Bernard et al. (2007) and Simonovska and Waugh (2014), we assume a trade elasticity $\theta = 4$.

By construction, as in the first three of our scenarios we assume an increase in the efficiency of a subset of the *existing* TAs, we expect larger gains for those countries with high trade shares happening under TAs already in place. In the fourth and fifth scenarios we model the entry into force of a Latin American-wide TA, under different assumptions (average TA effect and "best intra-Latin American performer" TA effect).

In table 6 we report the general equilibrium results under the five scenarios discussed above. The effects must be interpreted as long-term effects, i.e. the changes have reached

Table 6: Structural gravity – General equilibrium estimates of deeper Latin American integration.

		Scenario 1: Decrease bilateral trade costs to best performer for *existing* intra-Latin American TAs		Scenario 2: Decrease bilateral trade costs to best performer for *existing* Latin American-RoW TAs		Scenario 3: scenario 1 + scenario 2		Scenario 4: RTA among Latin American countries (best performer)		Scenario 5: RTA among Latin American countries (average intra-Latin America TA effect)	
	Country	***Δ%Trade***	***Δ%Welfare***	***Δ%Trade***	***Δ%Welfare***	***Δ%Trade***	***Δ%Welfare***	***Δ%Trade***	***Δ%Welfare***	***Δ%Trade***	***Δ%Welfare***
Latin American Countries	ARG	64.73	1.64	-1.89	-0.03	45.18	1.15	92.57	2.30	25.41	0.61
	BOL	22.89	2.17	-2.61	-0.25	13.00	1.17	105.64	12.26	32.32	3.20
	BRA	23.95	0.62	-1.97	-0.05	15.54	0.41	48.41	1.26	13.24	0.34
	CHL	16.34	1.44	113.99	11.94	120.58	12.83	42.92	4.05	12.05	1.07
	COL	31.01	1.50	92.63	4.57	109.31	5.50	54.16	2.58	15.18	0.69
	CRI	45.57	3.74	103.26	9.33	124.60	11.72	50.76	4.33	14.85	1.18
	DOM	4.99	0.44	20.04	1.22	23.12	1.48	32.24	2.50	9.50	0.71
	ECU	23.93	1.64	-2.79	-0.15	13.39	0.93	52.73	3.68	14.95	0.98
	GTM	64.21	4.76	72.54	5.40	107.64	8.37	66.74	5.10	19.94	1.41
	GUY	7.36	0.89	22.84	3.60	27.01	4.19	24.81	4.87	7.46	1.32
	HND	43.83	7.34	83.86	13.42	101.88	18.14	44.32	7.57	13.54	2.08
	HTI	0.55	0.14	-1.16	0.00	-0.90	0.07	35.39	6.30	10.01	1.83
	JAM	1.97	0.21	22.04	1.29	23.36	1.41	19.24	3.18	5.34	0.92
	MEX	5.01	0.57	105.48	17.03	107.33	17.39	9.34	1.09	2.58	0.29
	NIC	50.94	12.25	58.16	10.18	82.08	18.27	56.26	13.84	18.46	3.82
	PAN	20.94	1.59	27.83	4.05	41.45	5.10	56.04	5.38	17.04	1.43
	PER	35.57	2.16	121.52	7.78	138.79	9.17	48.94	3.05	13.67	0.81
	PRY	84.03	7.90	-1.79	-0.09	61.22	5.60	104.15	9.77	31.06	2.56
	SLV	64.80	8.46	61.99	8.11	95.57	13.36	66.47	9.08	20.81	2.51
	URY	69.22	4.46	-1.81	-0.05	47.96	3.11	83.87	5.18	23.67	1.38
	VEN	-0.43	-0.04	-1.74	-0.15	-2.03	-0.17	33.84	3.41	10.08	0.94
Rest of the World	AUS	-0.08	0.00	-0.48	-0.01	-0.52	-0.01	-0.17	0.00	-0.05	0.00
	AUT	-0.05	0.00	0.77	0.11	0.72	0.11	-0.11	0.00	-0.03	0.00
	BEL	-0.06	-0.02	0.32	0.59	0.28	0.57	-0.11	-0.03	-0.03	-0.01
	CAN	-0.08	-0.01	4.40	0.49	4.31	0.48	-0.20	-0.01	-0.06	0.00
	CHE	-0.08	-0.01	1.54	0.28	1.46	0.27	-0.15	-0.01	-0.04	0.00
	CHN	-0.20	-0.01	1.72	0.04	1.54	0.03	-0.43	-0.02	-0.12	0.00
	CZE	-0.05	-0.01	0.30	0.32	0.26	0.32	-0.08	-0.01	-0.02	0.00
	DEU	-0.07	-0.01	1.37	0.18	1.31	0.17	-0.13	-0.01	-0.04	0.00
	DNK	-0.10	0.00	1.05	0.10	0.96	0.10	-0.18	-0.01	-0.05	0.00
	ESP	-0.17	-0.01	4.78	0.33	4.60	0.32	-0.30	-0.01	-0.09	0.00
	FRA	-0.08	0.00	1.39	0.10	1.31	0.10	-0.14	0.00	-0.04	0.00
	GBR	-0.06	0.00	0.75	0.06	0.69	0.06	-0.12	0.00	-0.04	0.00
	GRC	-0.05	0.00	1.20	0.07	1.14	0.07	-0.14	0.01	-0.04	0.00
	HUN	-0.04	0.00	0.41	0.25	0.37	0.24	-0.08	-0.01	-0.02	0.00
	IND	-0.20	0.00	-1.27	-0.01	-1.38	-0.01	-0.19	0.00	-0.05	0.00
	IRL	-0.04	-0.01	0.73	0.11	0.68	0.10	-0.10	-0.03	-0.03	-0.01
	ISL	-0.09	-0.01	0.74	0.10	0.67	0.09	0.02	0.02	0.00	0.00
	ITA	-0.09	0.00	2.12	0.14	2.03	0.13	-0.19	-0.01	-0.05	0.00
	JPN	-0.10	0.00	4.10	0.13	4.00	0.13	-0.29	-0.01	-0.08	0.00
	KOR	-0.13	-0.01	0.39	0.05	0.28	0.04	-0.29	-0.03	-0.08	-0.01
	LUX	-0.05	0.00	0.22	0.07	0.19	0.07	-0.08	0.01	-0.02	0.00
	NLD	-0.06	-0.01	0.84	0.52	0.78	0.51	-0.13	-0.03	-0.04	-0.01
	NOR	-0.07	-0.01	0.42	0.03	0.37	0.03	-0.12	-0.01	-0.03	0.00
	NZL	-0.10	0.00	-0.43	0.00	-0.49	0.00	-0.33	-0.01	-0.11	0.00
	POL	-0.05	0.00	0.45	0.10	0.41	0.10	-0.10	0.00	-0.03	0.00
	PRT	-0.08	0.00	1.24	0.14	1.16	0.13	-0.17	0.00	-0.05	0.00
	RUS	-0.11	-0.01	-0.72	-0.05	-0.79	-0.06	-0.21	-0.01	-0.06	0.00
	SVK	-0.04	0.00	0.06	0.13	0.03	0.13	-0.08	0.00	-0.02	0.00
	SWE	-0.07	0.00	0.99	0.09	0.93	0.08	-0.11	0.00	-0.03	0.00
	TUR	-0.08	0.00	-0.30	0.02	-0.35	0.02	-0.17	0.00	-0.05	0.00
	USA	-0.42	-0.01	26.23	0.67	25.69	0.66	-0.76	-0.01	-0.22	0.00
	ZAF	-0.09	-0.01	-0.87	-0.06	-0.93	-0.06	-0.20	-0.01	-0.06	0.00

Source: Authors' elaboration

its maximum potential in terms of trade creation (according to the literature, trade agreements reach their maximum potential between 8 and 12 years after their entry into force, see Bergstrand et al., 2015, for more details). The predicted changes in trade and welfare are large and significant for a majority of countries. While gains from trade are more balanced in the cross-section for Latin American countries when we simulate deeper trade integration within Latin American (either by increasing the "efficiency" of existing TAs or when we simulate a new Latin American TA), there are important differences stemming from decreasing bilateral trade costs for all dyads of those TAs that involve both Latin American and rest of the world countries to those of the "best performing" TA (deriving from the unequal participation in TAs with the rest of the world across Latin American countries). Therefore, depending on the scenario, gains in trade and welfare do not avoid trade diversion effects to prevail for a number of countries (see Table 6, Column 2).[21] The main message underpinning all these scenarios is that further gains in trade and welfare are attainable for Latin American countries by the means of deeper integration. While our scenarios 1, 2, 3 and 4 certainly reflect upper bound estimates for the majority of Latin American countries, they also show that we cannot rule out the hypothesis that uncoordinated actions might divert trade away from certain countries to others. Scenario 5 is a comparably "more realistic" scenario, where all Latin American countries sign a regional trade agreement that reduces bilateral trade costs as the average TAs currently in force in Latin America. In other words, the "trade effect" of this TA is equal to the average of the existing TAs among Latin American countries. Obviously, trade and welfare increases are much more limited with respect to the other scenarios, but still large and significant (between 2.5 and 32% increase in trade, and between 0.3 and 3.8% increase in welfare). In this latter scenario, trade diversion effects are close to zero.

Nevertheless, these results are subject to certain caveats: the structural gravity general equilibrium model we use is a one sector one factor of production model. Additionally, we perform the estimations with aggregate bilateral data. This means that we do not account for possible heterogeneous effects across the distribution of sectors, firms and households (Grossman and Helpman, 2018; Artuc et al., 2019). Finally, we recall that trade in services, inherently different from trade in goods (see Mattoo et al., 2006), and the effects of its liberalization are outside the scope of this paper.

[21] In Scenario 2 and 3 (Column 2 and 3, Table 5), the positive results obtained for non-Latin American countries are stemming from the fact that we lower bilateral trade costs for LA-RoW TAs, which include all those agreements among Latin American (LA) and non-Latin American countries (RoW).

6. Conclusions

This study exploits econometric methods at the frontier of the empirical trade literature to estimate the effects of trade agreements on trade, both in terms of "average effect" and at the single agreement level, with particular attention to Latin America. Additionally, it estimates general equilibrium trade and welfare effects in different scenarios of further trade integration. We use a poisson pseudo-maximum likelihood estimation strategy (Santos-Silva and Tenreyro, 2006) and account for intra-national trade flows, as TAs may affect the economic incentives of selling goods domestically rather than internationally (to TA's members).

We find that, overall, trade agreements included in our sample have a positive and significant (average) effect on bilateral trade among members. However, when estimating the effects at the single agreement level, we discover a considerable degree of heterogeneity in the results. Indeed, 38 (64%) of the 59 estimations performed at the TA level have trade-enhancing effects, whereas 19 (32%) of them have no significant effect on trade. The remaining 2 (3%) have negative effect on trade.

In other words, while acknowledging a substantial degree of heterogeneity across trade agreements, our findings point towards a positive and economically significant effect – on average – of TAs on Latin American trade. Additionally, our quantification of general equilibrium effects on the trade volumes and welfare of Latin American countries under alternative scenarios of deeper integration indicates that further gains are attainable: while the majority of our scenarios surely portray upper end estimates of these benefits, they are useful benchmarks. Generally, deeper integration across Latin American countries does not necessarily mean improving the content and the scope of existing TAs individually. Possibly, a coordinated approach and the implementation of new, large, and encompassing regional agreements may be a more effective way to deal with the problem (as suggested by IADB, 2018). However, to understand the institutional design capable of maximizing the gains from trade for Latin American countries is outside the scope of this paper.

Finally, our evidence – in support of large and positive aggregate welfare gains for Latin America deriving from further trade integration – does not shed light on the distribution of these gains across sectors, firms and households in Latin America. Indeed, a vast and expanding literature argues that trade integration (and globalization more broadly) may produce winners and losers (Williamson, 2005; Geishecker and Görg, 2008; Autor et al., 2013; Artuc and McLaren, 2015; Lin and Fu, 2016), and that deriving higher growth rates may go hand in hand with higher wage inequality (Grossman and Helpman, 2018; Artuc et al., 2019). Other authors argue that side effects may feed in into politics (Autor et al., 2016; Colantone and Stanig, 2018a; Colantone and Stanig, 2018b), and studies on some potential policy responses are becoming available (i.a., see Claeys and Sapir, 2018, on the European Globalization Adjustment Fund). These issues deserve further research and consideration within the Latin American context.

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Appendix

Table A.1: Countries included in the database

Argentina, Australia, Austria, Belgium, Bolivia, Brazil, Canada, Switzerland, Chile, China, Colombia, Costa Rica, Czech Republic, Germany, Denmark, Dominican Republic, Ecuador, Spain, France, Great Britain, Greece, Guatemala, Guyana, Honduras, Haiti, Hungary, India, Ireland, Iceland, Italy, Jamaica, Japan, Rep. of Korea, Luxembourg, Mexico, Nicaragua, Netherlands, Norway, New Zealand, Panama, Peru, Poland, Portugal, Paraguay, Russia, El Salvador, Slovakia, Sweden, Turkey, Uruguay, United States, Venezuela and South Africa

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